CLOSURES FOR ASEPTIC FILLED CONTAINERS

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References Cited

UNITED STATES PATENTS

2,644,452 7/1953 Brown 215/38

ABSTRACT

This disclosure relates to closures for aseptic filled containers, and more particularly to a closure which includes a tubular body open at opposite ends, the tubular body being threadably or otherwise conventionally secured to a container finish with the container mouth being closed by a puncturable but self-sealable membrane. The hermetically closed but empty container is thereafter sterilized by retorting, irradiation, or by the injection of a small amount of a sterilizing gas into the container by a needle passed through the puncturable membrane. Thereafter the container is ready for subsequent filling by use of a conventional double-hollow needle technique after which the closure is completed by securing a disc to the closure body immediately above the puncturable membrane.

11 Claims, 4 Drawing Figures
CLOSURES FOR ASEPTIC FILLED CONTAINERS

Each closure of the present invention consists of several components so constructed that it may be screwed or otherwise conventionally secured to the finish of a standard rigid or semiflexible container. A lower terminal edge of a peripheral skirt of each closure is secured in the assembled position upon the container by spinning over the terminal edge portion to engage a conventional transfer bead immediately below the threaded neck of a conventional bottle. Alternately, the extended terminal portion of the peripheral skirt may be secured to the bottle by means of an adhesive.

The closure includes a tamperproof feature formed by a plurality of small connections circumferentially spaced about the closure periphery between the body proper and the extended terminal portion. When these areas have been fractured, the fact that the container has been tampered with is self-evident.

After the closure has been so secured to a conventional bottle, jar or similar container, but before the container is filled and before a final top closure disc is sealed into place, the empty but hermetically closed container is sterilized by retorting, irradiation, or by the injection of a small amount of a sterilizing gas, such as ethylene oxide or propylene oxide. Details of typical sterilizing processes which may be employed in keeping with the present invention are found in the commonly assigned following patents to the present inventor, namely: U.S. Pat. Nos. 3,245,200 issued Apr. 12, 1966; 3,382,642 issued May 14, 1968; and 3,299,603 issued Jun. 24, 1967.

The internal sterile container is thereafter ready for subsequent filling with sterile liquids or sterile fluent solids by use of a conventional double hollow needle technique as described in the latter-mentioned patents. In the present case, however, the concentric hollow needles are forced through an elastomeric puncturable and self-sealable membrane whereupon at the termination of the filling process, the needle is withdrawn and due to the self-sealing properties of the membrane the point at which the needle penetrates self-closes and no heat sealing or similar closing operation is necessary. After the filling operation, the completion of the closure takes place by securing a disc to the closure body above the puncturable membrane and securing the same in such position by means of an adhesive or other conventional material depending, of course, on the particular material from which the closure and/or its components have been fabricated.

More specifically, one closure constructed in accordance with the invention includes a closure body having a transfer bead and a terminal panel which is eventually secured to an end of a closure body opposite a peripheral threaded skirt having an end adapted to be spun into locked engagement with a bottle transfer bead. A membrane constructed from puncturable and self-sealable material is positioned upon a lip of the container finish and is secured thereat by an overlying radially inwardly directed flange of the peripheral skirt. The closure disc is adhesively or otherwise secured upon this inwardly directed flange to complete the formation of the closure.

In accordance with another similar closure of this invention, the peripheral skirt is formed of a pair of peripheral walls, each of which includes a radially inwardly directed flange with the puncturable and self-sealable membrane being clamped therebetween upon the threaded engagement of the peripheral walls to each other. As in the case of the first-described closure, a separate disc is secured in seated engagement upon an uppermost pair of the flanges while if necessary or desirable a sealing gasket is seated between the lowestmost of the pair of flanges and a lip of the container finish.

With the above and other objects in view that will hereinafter appear, the nature of the invention will be more clearly understood by reference to the following detailed description of the invention, including the appended claims, subject matter, and the several views illustrated in the accompanying drawings.

In the drawings:
the latter has been accomplished the terminal end 17 is folded into locked position upon the transfer bead T in the manner heretofore described and as shown in FIG. 2. It is pointed out that the membrane 27 is constructed from yieldable material and the peripheral skirt 14 is threaded home the periphery of the membrane 27 is clamped between the container lip L and the under surface or wall 23 of the flange 21 thereby forming a hermetic seal.

At this time the final closure disc 11 is not in assembled relationship, as shown in FIG. 2, and the empty but hermetically sealed container may be sterilized by retorting, irradiation, or by the injection of a small amount of sterilizing gas, in the manner described in the latter-noted patents. Thereafter sterile liquids and/or sterile solid solids may be injected into the container C through the use of a double-hollow needle technique, again as described in the latter-noted patents. The concentric hollow needle is, of course, forced through the puncturable membrane 27 and after the filling operation is completed, the needle is withdrawn with the puncture hole closing itself due to the self-sealing properties of the membrane material. Thereafter the final closure disc 11 is seated upon the upper surface or wall 22 of the flange 21 and is secured in the position shown in FIG. 2 by an adhesive or other conventional means. The disc 11 is, of course, preferably constructed from the same material as that of the component 12 which may be, for example, polyethylene or similar polymeric or copolymeric material. However, if the component 12 were constructed from metallic material, the disc 11 could, of course, be secured thereto by means of a double-seam, solder or similar conventional means depending upon the material from which the principal components of the closure have been fabricated.

Referring now to FIGS. 3 and 4 of the drawings, another identical container is illustrated and the components have been identically provided with the reference characters C, T, F and L to designate respectively the container, the transfer bead thereof, the threaded neck finish, and the sealing lip. A closure 30 is formed of four components 31 through 34 and may, if found necessary or desirable, include a fifth component 35. The components 31 and 34 are identical to the respective final closure disc 11 and the puncturable but self-sealable member 27 of the closure 10 of FIG. 1. Thus, a further description of these two components is considered unnecessary for a complete understanding of this invention.

The components 32, 33 collectively define a closure body with the component 32 thereof being an upper tubular member and the component 33 a lower tubular member. The upper tubular member 32 includes a peripheral skirt 36 which is internally threaded at 37 and thereafter is a radially inwardly directed flange 38 defined by a lower annular wall 40, an upper annular wall 41, and an innermost circumferential wall 42. The flange 38 functions as a support for the final closure disc 31 in the same manner as that heretofore described with respect to the closure disc 11 and the flange 21 of FIG. 1.

The lower tubular member 33 includes an upper external threaded portion 43 and a lower internal threaded portion 44 terminating adjacent a reduced terminal end portion 45. The terminal end portion 45 is identical to the terminal end portion 17 of the closure 10 and additionally includes taper-indicating means 46 (FIG. 4) identical in structure and function to the means 20 of the closure 10.

The lower tubular body 33 additionally includes a radially inwardly directed flange 47 defined by an upper annular wall 48, a lower annular wall 50 and an innermost circumferential wall 51. The upper wall 48 functions as a support or seat for the puncturable membrane 34. Preferably the thickness of the puncturable membrane 34 is slightly greater than that of a wall 52 while the diameter of the membrane 34 corresponds substantially to that of the wall 52 in order that the membrane 34 may be maintained in seated condition upon the flange 47 by the frictional purchase between its periphery and the wall 52.

The component 35 is a conventional sealing gasket of an annular configuration which is adapted to seat upon the container lip L in the manner best illustrated in FIG. 4. The particular material from which the gasket 35 is constructed may vary and is not critical. However, the diameter of the gasket 35 is greater than the diameter of the wall 51 such that the flange 47 will overlie and clamp the gasket upon the lip L in the manner best illustrated in FIG. 4.

The closure 30 is assembled prior to being placed upon the container C by first inserting the gasket 35 into the lower tubular member 33 and seating the same against the lower annular wall 50 of the flange 47. Though not illustrated, the diameter of the gasket 35 may be as large as the valleys defined by the threads 43 such that the gasket will be held captive in the uppermost valley of the threads immediately adjacent the lower wall 50. In this manner the gasket 35 and the lower tubular member 33 can be preassembled prior to being applied to the container finish F.

The puncturable membrane 34 is seated upon the wall 48 of the flange 47 after which the upper tubular member 32 is threadedly secured to the position shown in FIG. 4. As was heretofore noted, due to the greater thickness of the membrane 34 as compared to the height of the wall 52, the periphery of the membrane 34 is compressed against the walls 40, 48 of the respective flanges 38, 47 thereby achieving a hermetic seal between the upper and lower tubular members 32, 33, respectively.

The closure 30 is now completely assembled except for the final securement of the disc 31 thereto which is, of course, accomplished only after the container C has been sterilized and filled in the manner heretofore described. Thereafter the final closure disc 31 is seated upon the flange 38 and is secured thereto by adhesive or other conventional means in the manner heretofore described.

Whatever fill has been charged into either of the containers can be removed simply by grasping the respective closures 10, 30 and on threading the same from the finish F during which time the lower terminal ends 17, 45 are fractured along the respective weakening lines 20, 46. In both cases the once removed closures can be reapplied and a fluid-type seal is again obtained by means of the sealing contact between the membrane 27 and the lip L or the gasket 35 and the lip L.

It is also pointed out that in keeping with the construction of the closure 30 of FIGS. 3 and 4, the component 32 is preferably threaded upon the threads 43 by a counterclockwise rotation which is the same direction of rotation to untread the threads 44 from the neck finish F. In other words, by rotating the component 32 counterclockwise the threads 37, 43 can be tightened no further and the entire cap can be removed as the threads 44 untread with respect to the finish F during counterclockwise rotation of the closure 30.

While preferred forms and arrangements of parts have been shown in illustrating the invention, it is to be clearly understood that various changes in details and arrangement of parts may be made without departing from the spirit and scope of this disclosure.

I claim:

1. A closure particularly adapted for aseptic packaging comprising a closure body including an end panel and a depending peripheral skirt having axially remote upper and lower end portions, means for securing said peripheral skirt to a container finish, a membrane in said closure body adjacent said end panel, said membrane being constructed from puncturable and self-sealable material, said peripheral skirt including radially inwardly directed support means positioned above said membrane, said support means and an inner peripheral surface of said upper peripheral skirt end portion defining a chamber, said chamber being a separate body placed in said chamber and seated upon said support means, and means permanently securing said end panel to said closure body in a seated relationship upon said support means.

2. The closure as defined in claim 1 wherein said peripheral skirt is formed as a pair of peripheral walls, means for securing
said walls to each other, and cooperative means carried by said walls for clampingly securing said membrane therebetween.

3. The closure as defined in claim 1 wherein said membrane is disposed beneath said support means and is adapted to be held in seated relationship against said support means by a container lip.

4. The closure as defined in claim 1 wherein said support means is defined by a radially inwardly directed peripheral flange, said peripheral flange being defined by upper and lower annular walls, and said end panel being seated upon said upper annular wall.

5. The closure as defined in claim 4 including a container finish terminating in a sealing lip, and said membrane is clamped between said sealing lip and said lower annular wall.

6. The closure as defined in claim 5 wherein said upper and lower annular walls merge with respective upper and lower inner peripheral walls of said peripheral skirt, and said upper inner peripheral wall is of a larger diameter than that of said lower inner peripheral wall.

7. The closure as defined in claim 2 wherein said cooperative means is defined by said support means carried by one of said pair of peripheral walls and other support means carried by another of said pair of peripheral walls with said membrane being in sandwiched relationship therebetween.

8. The closure as defined in claim 2 wherein said securing means are cooperative screw threads.

9. The closure as defined in claim 7 wherein said first and another support means are a pair of spaced radially inwardly directed peripheral flanges.

10. The closure as defined in claim 9 wherein said securing means are cooperative screw threads carried by said pair of peripheral walls whereby the clamping force exerted upon said membrane can be regulated by the degree of tightening of said pair of peripheral walls.

11. The closure as defined in claim 10 including a container finish terminating in a sealing lip, and sealing means disposed between said sealing lip and the peripheral flange most closely adjacent thereto.

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